इंटरनेट मानक

Disclosure to Promote the Right To Information

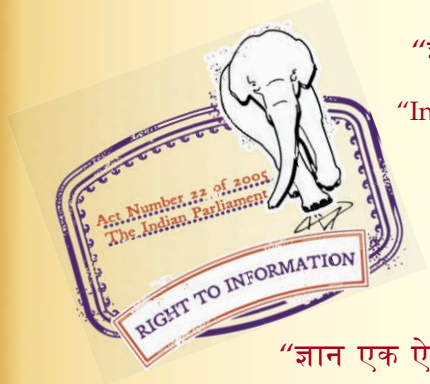
Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 3708-3 (1985): Methods of Test for Natural Rubber Latex, Part 3: Determination of Density between 5oC and 40o [PCD 13: Rubber and Rubber Products]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"



"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

Indian Standard

METHODS OF TEST FOR NATURAL RUBBER LATEX

PART 3 DETERMINATION OF DENSITY

NRL : 6

(First Revision)

Rubber Sectional Committee, PCDC 14

Chairman	*Representing*
SHRI LALIT MOHAN JAMNADAS	Cosmos India Rubber Works Pvt Ltd, Bombay
Vice-Chairman	
SHRI S. B. GANGULI SHRI K. S. LOGANATHAN (*Alternate*)	Dunlop India Ltd, Calcutta
Members	
SHRI SATISH ABRAHAM	Padinjarekara Agencies Ltd, Kottayam
SHRI O. P. AGARWAL SHRI J. N. JHA (*Alternate*)	Transasia Carpets Ltd, Sikandrabad
SHRI A. K. BANDYOPADHAYAY SHRI V. BHATTACHARYA (*Alternate*)	Ministry of Defence (DGI)
DR B. BANERJEE	Carbon and Chemicals India Ltd, Cochin
DR D. BANERJEE	Econ Consultants Pvt Ltd, Calcutta
DR P. S. BHARGAVA SHRI N. C. SAMAJDAR (*Alternate*)	Alkali and Chemical Corporation of India Ltd, Calcutta
SHRI J. CHATTERJEE SHRI A. K. BISWAS (*Alternate*)	Andrew Yule & Co Ltd, Calcutta
DR D. K. DAS SHRI A. GHOSH (*Alternate*)	National Test House, Calcutta
SHRI P. B. G. DASTIDAR SHRI S. SARKAR (*Alternate*)	Bata India Ltd, Calcutta
SHRI S. L. GANDHI SHRI H. C. PERTI (*Alternate*)	Ministry of Defence (R & D)
SHRI J. M. GARG	Directorate General of Technical Development, New Delhi

(*Continued on page* 2)

(*Continued from page* 1)

Members	*Representing*
SHRI A. GEORGE JOHN	Madras Rubber Factory Ltd, Madras
SHRI K. J. JOSEPH	Plantation Corporation of Kerala Ltd, Kottayam
SHRI K. T. VARGHESE (*Alternate*)	
SHRI G. R. KAVISHVAR	Indian Rubber Regenerating Co Ltd, Thane
SHRI P. S. VIRANI (*Alternate*)	
SHRI N. S. KHANNA	All India Rubber Industries Association, Bombay
SHRI R. R. PANDIT (*Alternate*)	
SHRI K. N. KOSHY	M. M. Rubber Co Ltd, Madras
SHRI N. SUBRAMANIAN (*Alternate*)	
SHRI P. K. MADHAVA MENON	Thirumbadi Rubber Co Ltd, Mokkam
SHRI L. K. MATHUR	Modi Rubber Ltd, Modipuram
SHRI D. W. MCCRIRICK	Association of Planters of Kerala, Cochin
SHRI P. K. MENON (*Alternate*)	
SHRI P. K. MENON	United Planters' Association of Southern India, Coonoor
SHRI E. B. UNNI (*Alternate*)	
DR W. MILLNS	Indian Rubber Manufacturers Research Association, Thane
SHRI N. B. FEGADE (*Alternate*)	
SHRI R. MURLEEDHARAN NAIR	Hindustan Latex Ltd, Bangalore
SHRI R. R. PANDIT	Bayer (India) Ltd, Bombay
SHRI D. J. BHARUCHA (*Alternate*)	
SHRI S. A. PASHA	London Rubber Co (India) Ltd, Madras
SHRI R. KRISHNAN (*Alternate*)	
SHRI M. C. PAUL	Arakkunnam Co-operative Rubber Marketing Society Ltd, Arakkunnam
SHRI K. S. RADHAKRISHNAN	National Rubber Manufacturers Ltd, Calcutta
SHRI R. P. MATHUR (*Alternate*)	
SHRI A. RAJAMANI	Automotive Tyre Manufacturers' Association, New Delhi
SHRI P. C. SENGUPTA (*Alternate*)	
SHRI RAJINDER SINGH	State Trading Corporation of India Ltd, New Delhi
SHRI O. P. ARORA (*Alternate*)	
DR S. B. RATH	Synthetics and Chemicals Ltd, Bombay
SHRI H. C. CHOPRA (*Alternate*)	
SHRI S. V. SARMA	Travancore Rubber & Tea Co Ltd, Trivandrum
SHRI C. S. KRISHNASWAMY (*Alternate*)	
SHRI SUNIL I. SHAH	Indian Petrochemicals Corporation Ltd, P. O. Petrochemicals, Vadodara
SHRI A. K. MALLIK (*Alternate*)	
SHRI E. V. THOMAS	Rubber Research Institute of India, Kottayam; *and* Rubber Board, Kottayam
DR M. G. KUMARAN (*Alternate* I)	
DR N. M. MATHEW (*Alternate* II)	
SHRI M. S. SAXENA, Director (P & C)	Director General, ISI (*Ex-officio Member*)

Secretary

SHRI DILEEP KUMAR
Assistant Director (P&C), ISI

(*Continued on page* 11)

Indian Standard

METHODS OF TEST FOR NATURAL RUBBER LATEX

PART 3 DETERMINATION OF DENSITY

NRL : 6

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part 3) (First Revision) was adopted by the Indian Standards Institution on 8 March 1985, after the draft finalized by the Rubber Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 Test methods for rubber latex had been originally covered in the following Indian Standards:

For natural rubber latex

IS : 3708 (Part 1)-1966*
IS : 3708 (Part 2)-1968†

For styrene butadiene rubber latex

IS : 4511 (Part 1)-1967‡

Since some of the test methods covered in the above standards were common, the concerned committee had decided some years ago to unify and publish a separate series of methods of test which would be applicable to all types of latices — natural as well as synthetic. Accordingly, the following six test methods had been covered under IS : 9316.

*Methods of test for natural rubber latex: Part 1 Dry rubber content, sludge content, density, total alkalinity, KOH-number, mechanical stability, volatile fatty acid number, pH, total nitrogen, total copper, total iron, total manganese and total ash.

†Methods of test for natural rubber latex, Part 2.

‡Methods of tests for styrene-butadiene rubber (SBR) latices: Part 1 Determination of dry polymer, pH, density, residual styrene, bound styrene and soap content.

IS : 9316 Methods of test for rubber latex:

Part 1-1979 Determination of surface tension
Part 2-1979 Determination of viscosity
Part 3-1979 Determination of coagulum content
Part 4-1979 Determination of total solids content
Part 5-1979 Drawing of samples
Part 6-1982 Determination of *p*H

0.2.1 As a result of further rethinking on the subject, it has now been decided to re-designate the test methods common to natural and synthetic rubber latices as RL series; test methods for natural rubber latex as NRL series and test methods for styrene-butadiene rubber latex as SBRL series. Consequently, test methods for rubber latex have been rationalized into the following three series:

a) IS : 9316 Unified methods of test applicable to both natural and synthetic rubber latices — RL series;
b) IS : 3708 Methods of test applicable to natural rubber latex — NRL series; and
c) IS : 4511 Methods of test applicable to styrene-butadiene rubber latex — SBRL series.

0.3 The existing Indian Standards under IS : 3708 (Parts 1* and 2†), IS : 4511 (Part 1‡) and IS : 9316 (Parts 1 to 6) are being gradually replaced by separate standards under the above three series, designated by the appropriate NRL, SBRL or RL series, respectively.

0.3.1 The methods covered under NRL 13, NRL 14 and NRL 15 of IS : 3708 (Part 1)-1966 which are also under revision, have been proposed to be covered under the RL series in IS : 9316 (*under revision*).

0.4 In order to facilitate cross-reference, it has been decided to retain the original discrete NRL series numbers assigned to various test methods in IS : 3708 (Parts 1 and 2) in the revised parts of IS : 3708.

0.4.1 For proper referencing of the existing test methods and the new methods under revision, a statement showing corresponding methods is given in Appendix A.

0.5 In preparing the above series, the need to align the test methods with the corresponding ISO standards/DIS/DP wherever available has also

*Methods of test for natural rubber latex: Part 1 Dry rubber content, sludge content, density, total alkalinity, KOH-number, mechanical stability, volatile fatty acid number, *p*H, total nitrogen, total copper, total iron, total manganese and total ash.

†Methods of test for natural rubber latex, Part 2.

‡Methods of tests for styrene-butadiene rubber (SBR) latices: Part 1 Determination of dry polymer, *p*H, density, residual styrene, bound styrene and soap content.

been taken into account for updating the test methods. In the preparation of this standard, assistance has been derived from ISO 705-1974 'Natural rubber latex — Determination of density', issued by the International Organization for Standardization (ISO).

0.6 Density determination is used to calculate the mass of a measured volume of latex in locations where it is not possible to weigh directly. For such purposes it is essential that the density be determined on a latex sample containing the same amount of air as it contained when the volume was measured. Before sampling, the latex is, therefore, allowed to stand for a minimum period of 24 hours to ensure the removal of air bubbles.

0.7 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

---

1. SCOPE

1.1 This standard (Part 3) prescribes a method for the determination of density of natural rubber latex of *Hevea brasiliensis*, uncompounded, unvulcanized, and which may contain preservatives and has a total solids content up to 63 percent.

2. TERMINOLOGY

2.0 For the purpose of this test, the following definition shall apply.

2.1 Density — The mass divided by the volume at a stated temperature. The units shall be stated.

3. OUTLINE OF THE METHOD

3.1 The density of latex is determined by density bottle method and the result is expressed as g/ml at a definite temperature. A correction is applied, if the temperature of bulk of the latex differs from the temperature of sample taken for density determination.

4. APPARATUS

4.1 Chemical Balance

4.2 Constant Temperature Bath — accurate to within $\pm 0{\cdot}2°C$ and adjustable to a temperature above or below room temperature.

4.3 Density Bottle — 50-ml capacity having a ground-glass stopper perforated by a capillary and a ground-glass cap and, if desired, an evacuated jacket.

*Rules for rounding off numerical values (*revised*).

4.4 Two Conical Flasks — of at least 200-ml capacity, each fitted with a rubber stopper, a short glass inlet tube with a rubber blowing ball at the external end and a glass outlet tube reaching nearly to the bottom of the flask.

5. PROCEDURE

5.1 Adjust the temperature of the constant temperature bath to the desired temperature. Stir the sample of latex gently without introducing air bubbles. Fill one of the conical flasks with a suitable amount of the latex and place in the bath. Likewise, partly fill the second conical flask with freshly boiled distilled water and place in the bath. Weigh the clean and dry density bottle with stopper and cap to the nearest 0·001 g and immerse up to its neck in the bath with the ground-glass stopper in place but not the cap. Bring the density bottle and, the latex and water in the two conical flasks to the temperature of the constant temperature bath. This will require a minimum of about 3 hours in the case of a jacketed bottle and 20 minutes in the case of an unjacketed bottle. First blow a few millilitres of latex from the conical flask containing the latex and discard. Then blow sufficient latex from the conical flask into the density bottle to fill it completely. Put the stopper in place and wipe the top surface immediately clean, taking care not to remove any latex from the capillary tube. Remove the bottle from the bath and place the ground glass cap on immediately. Dry the outside with the minimum of handling and then weigh the bottle to the nearest 0·001 g. Empty the density bottle and wash free from latex with water. Immerse the bottle again in the bath as before. Fill the bottle with water by blowing from the second conical flask and allow to stand for 5 minutes. Empty the bottle and completely refill, while still immersed in the bath by the same procedure.

5.1.1 Put the stopper in place and wipe the top surface immediately dry, taking care not to remove any water from the capillary tube. Remove the bottle from the bath and place the ground glass cap on immediately. Dry the outside with the minimum of handling and weigh the bottle to the nearest 0·001 g. The results of duplicate tests shall agree within 0·001 g/ml.

6. CALCULATION

6.1 Calculate the density of the latex from the following formula:

$$D = \frac{M_L \times D_W}{M_W}$$

where

D = density of latex at the temperature of the constant temperature bath in g/ml,

M_L = mass in g of latex in the density bottle,

D_W = density of water at the bath temperature in g/ml, and

M_W = the mass in g of water in the density bottle.

6.2 If the temperature of the density determination of the sample tubes differs from that of the bulk of the latex, apply a correction by calculation, using Table 1, as follows:

$$D = A + B - C$$

where

D = density of latex,

A = density measured at temperature of test,

B = correction value from table for temperature of test and *DRC* of latex, and

C = correction value from table for temperature of bulk of latex and *DRC* of latex.

TABLE 1 DENSITY CONVERSION VALUES FOR NATURAL RUBBER LATEX

(*Clause* 6.2)

Temperature °C	Density of Water	Correction for Dry Rubber Content									
		20 per-cent	25 per-cent	30 per-cent	35 per-cent	40 per-cent	45 per-cent	50 per-cent	55 per-cent	60 per-cent	65 per-cent
	g/ml	g/ml	g/ml	g/ml	g/ml	g/ml	g/ml	g/ml	g/ml	g/ml	g/ml
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0	0·999 87	0·000 0	0·000 0	0·000 0	0·000 0	0·000 0	0·000 0	0·000 0	0·000 0	0·000 0	0·000 0
2	0·999 97	0·000 2	0·000 3	0·000 4	0·000 4	0·000 5	0·000 6	0·000 6	0·000 7	0·000 8	0·000 8
4	1·000 00	0·000 5	0·000 6	0·000 8	0·000 9	0·001 0	0·001 2	0·001 3	0·001 4	0·001 6	0·001 7
6	0·999 97	0·000 8	0·001 0	0·001 2	0·001 4	0·001 6	0·001 8	0·002 0	0·002 2	0·002 4	0·002 6
8	0·999 88	0·001 1	0·001 4	0·001 7	0·001 9	0·002 2	0·002 5	0·002 7	0·003 0	0·003 2	0·003 5
10	0·999 73	0·001 5	0·001 9	0·002 2	0·002 5	0·002 8	0·003 2	0·003 5	0·003 8	0·004 1	0·004 4
12	0·999 52	0·002 0	0·002 4	0·002 8	0·003 1	0·003 5	0·003 9	0·004 2	0·004 6	0·004 9	0·005 3
14	0·999 27	0·002 5	0·002 9	0·003 4	0·003 8	0·004 2	0·004 6	0·005 0	0·005 4	0·005 8	0 005 2
16	0·998 97	0·003 0	0·003 5	0·004 0	0·004 5	0·004 9	0·005 4	0·005 9	0·006 3	0·006 8	0·007 2
18	0·998 62	0·003 5	0·004 1	0·004 6	0·005 2	0·005 7	0·006 2	0·006 7	0·007 2	0·007 7	0·008 2
20	0·998 23	0·004 1	0·004 7	0·005 3	0·005 9	0·006 5	0·007 0	0·007 6	0·008 1	0·008 6	0·009 2
22	0·997 80	0·004 8	0·005 4	0·006 0	0·006 6	0·007 3	0·007 9	0·008 5	0·009 0	0·009 6	0·010 2
24	0·997 32	0·005 4	0·006 1	0·006 8	0·007 4	0·008 1	0·008 7	0·009 4	0·010 0	0·010 6	0·011 2
26	0·996 81	0·006 1	0·006 8	0·007 5	0·008 2	0·008 9	0·009 6	0·010 3	0·010 9	0·011 6	0·012 2
28	0·996 26	0·006 8	0·007 6	0·008 3	0·009 0	0·009 8	0·010 5	0·011 2	0·011 9	0·012 6	0·013 3
30	0·995 67	0·007 6	0·008 4	0·009 1	0·009 9	0·010 7	0·011 4	0·012 2	0·012 9	0·013 6	0·014 3
32	0·995 05	0·008 3	0·009 2	0·010 0	0·010 8	0·011 6	0·012 4	0·013 1	0·013 9	0·014 6	0·015 4
34	0·994 40	0·009 1	0·010 0	0·010 8	0·011 7	0·012 5	0·013 3	0·014 1	0·014 9	0·015 7	0·016 4
36	0·993 71	0·009 9	0·010 8	0·011 7	0·012 6	0·013 4	0·014 3	0·015 1	0·015 9	0·016 7	0·017 5
38	0·992 99	0·010 8	0·011 7	0·012 6	0·013 5	0·014 4	0·015 3	0·016 1	0·017 0	0·017 8	0·018 6
40	0·992 24	0·011 7	0·012 6	0·013 5	0·014 5	0·015 4	0·016 3	0·017 2	0·018 1	0·018 9	0·019 7

APPENDIX A

(*Clause* 0.4.1)

TABLE SHOWING CORRESPONDENCE OF THE VARIOUS METHODS OF TEST COVERED IN THE EXISTING IS : 9316 (PARTS 1 TO 5)-1979, IS : 9316 (PART 6)-1982, IS : 3708 (PART 1)-1966, IS : 3708 (PART 2)-1968, IS : 4511 (PART 1)-1967 *WITH* THE REVISION/PROPOSED REVISION OF IS : 9316, IS : 3708 AND IS : 4511

Existing Test Methods			Proposed Revision		Remarks
Test Method	IS No.	Part (Series)	IS No.	Series	
(1)	(2)	(3)	(4)	(5)	(6)
RL SERIES					
Determination of surface tension	IS : 9316-1979	Part 1	IS : 9316	Part 1 (RL : 1)	Under Revision
Determination of viscosity	IS : 9316-1979	Part 2	IS : 9316	Part 2 (RL : 2)	
Determination of coagulum content	IS : 9316-1979	Part 3	IS : 9316	Part 3 (RL : 3)	
Determination of total solids content	IS : 9316-1979	Part 4	IS : 9316	Part 4 (RL : 4)	
Drawing of samples	IS : 9316-1979	Part 5	IS : 9316	Part 5 (RL : 5)	
Determination of *p*H	IS : 9316-1982	Part 6	IS : 9316	Part 6 (RL : 6)	
Determination of total copper	IS : 3708-1966	Part 1 (NRL : 13)	IS : 9316	Part 7 (RL : 7)	
Determination of total iron	IS : 3708-1966	Part 1 (NRL : 14)	IS : 9316	Part 8 (RL : 8)	
Determination of total manganese	IS : 3708-1966	Part 1 (NRL : 15)	IS : 9316	Part 9 (RL : 9)	
NRL SERIES					
Determination of dry rubber content	IS : 3708-1966	Part 1 (NRL : 1)	IS : 3708	Part 1 (NRL : 1)	
Determination of sludge content	IS : 3708-1966	Part 1 (NRL : 5)	IS : 3708	Part 2 (NRL : 5)	
Determination of density	IS : 3708-1966	Part 1 (NRL : 6)	IS : 3708	Part 3 (NRL : 6)	
Determination of total alkalinity	IS : 3708-1966	Part 1 (NRL : 7)	IS : 3708	Part 4 (NRL : 7)	
Determination of KOH-number	IS : 3708-1966	Part 1 (NRL : 8)	IS : 3708	Part 5 (NRL : 8)	
Determination of mechanical stability	IS : 3708-1966	Part 1 (NRL : 9)	IS : 3708	Part 6 (NRL : 9)	

Existing Test Methods			Proposed Revision		Remarks
Test Method	IS : No.	Part (Series)	IS : No.	Series	
(1)	(2)	(3)	(4)	(5)	(6)
NRL SERIES					
Determination of volatile fatty acid number	IS : 3708-1966	Part 1 (NRL : 10)	IS : 3708	Part 7 (NRL : 10)	Under Revision
Determination of total nitrogen	IS : 3708-1966	Part 1 (NRL : 12)	IS : 3708	Part 8 (NRL : 12)	
Determination of total ash	IS : 3708-1966	Part 1 (NRL : 16)	IS : 3708	Part 9 (NRL : 16)	
Determination of boric acid	IS : 3708-1968	Part 2 (NRL : 17)	IS : 3708	Part 10 (NRL : 17)	
Determination of magnesium	IS : 3708-1968	Part 2 (NRL : 18)	IS : 3708	Part 11 (NRL : 18)	
SBRL SERIES					
Determination of dry polymer	IS : 4511-1967	Part 1 (SBRL : 1)	IS : 4511	Part 1 (SBRL : 1)	
Determination of density	IS : 4511-1967	Part 1 (SBRL : 6)	IS : 4511	Part 2 (SBRL : 6)	
Determination of residual styrene (volatile unsaturates)	IS : 4511-1967	Part 1 (SBRL : 8)	IS : 4511	Part 3 (SBRL : 8)	
Determination of bound styrene	IS : 4511-1967	Part 1 (SBRL : 9)	IS : 4511	Part 4 (SBRL : 9)	
Determination of soap content	IS : 4511-1967	Part 1 (SBRL : 10)	IS : 4511	Part 5 (SBRL : 10)	

(*Continued from page 2*)

Methods of Testing Subcommittee, PCDC 14 : 1

Convener	*Representing*
DR S. N. CHAKRAVARTY	Modi Rubber Ltd, Modipuram
Members	
SHRI S. K. MUSTAFI (*Alternate* to Dr S. N. Chakravarty)	
SHRI SATISH ABRAHAM	Padinjarekara Agencies Ltd, Kottayam
SHRI P. S. BALASUBRAMANIAM	L. G. Balakrishnan & Bros Ltd, Coimbatore
SHRI A. N. BHATTACHARYA SHRI B. PANJA (*Alternate*)	Union Commercial and Industrial Co Ltd, Calcutta
SHRI J. CHATTERJEE SHRI A. K. BISWAS (*Alternate*)	Andrew Yule & Co Ltd, Calcutta
SHRI P. K. CHATTERJEE SHRI D. J. BHARUCHA (*Alternate*)	Bayer (India) Ltd, Bombay
DR C. K. DAS SHRI R. P. MATHUR (*Alternate*)	National Rubber Manufacturers Ltd, Calcutta
SHRI J. M. GARG	Directorate General of Technical Development, New Delhi
SHRI G. R. KAVISHVAR SHRI P. S. VIRANI (*Alternate*)	Indian Rubber Regenerating Co Ltd, Thane
SHRI PULIN L. KINARIWALA SHRI S. N. GHADGE (*Alternate*)	Cosmos India Rubber Works Pvt Ltd, Bombay
SHRI K. S. LOGANATHAN DR S. CHATTOPADHYAY (*Alternate*)	Dunlop India Ltd, Calcutta
SHRI P. K. MADHAVA MENON	Thirumbadi Rubber Co Ltd, Mokkam
SHRI A. K. MALLIK DR Y. N. SHARMA (*Alternate*)	Indian Petrochemicals Corportion Ltd, P.O. Petrochemicals, Vadodara
DR W. MILLNS	Indian Rubber Manufacturers Research Association, Thane
SHRI P. L. NAG SHRI H. L. SRIVASTAVA (*Alternate*)	Ministry of Defence (DGI)
SHRI P. K. PAIN	National Test House, Calcutta
DR S. B. RATH SHRI H. C. CHOPRA (*Alternate*)	Synthetics & Chemicals Ltd, Bombay
SHRI S. V. SARMA SHRI C. S. KRISHNASWAMY (*Alternate*)	Travancore Rubber & Tea Co Ltd, Trivandrum
SHRI E. V. THOMAS DR N. M. MATHEW (*Alternate*)	Rubber Board, Kottayam
SHRI V. G. TORSEKAR SHRI V. K. SUD (*Alternate*)	Polyolefins Industries Ltd, Bombay

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2